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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/776,009	02/02/2001	Michael A. Vyvoda	MA-027	7430

33971 7590 05/07/2003

MATRIX SEMICONDUCTOR, INC.
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EXAMINER

MAI, ANH D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/776,009

Applicant(s)

VYVODA ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 30-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 30-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Amendment

1. Amendment filed January 14, 2003 has been entered as Paper No. 14. Claims 15-29 have been canceled. Claims 1, 30 and 44 have been amended. Claims 1-14 and 30-56 are pending.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-12, 14, 30-41, 43, 44-54 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (U.S. Patent No. 6,258,696), of record, in view of Lyons et al. (U.S. Patent No. 5,930,645).

With respect to claim 1, insofar the device is concerned, Lee teaches a wafer having a surface substantially similar as claimed including:

a plurality of regions of semiconductor (402') and dielectric (403) exposed at the surface of the wafer (400) after chemical mechanical planarization, wherein the semiconductor (402') regions have a total surface area that is less than or equal to a first fraction of a total surface area of the wafer (400) and each of the semiconductor regions have a shortest surface dimension that is less than or equal to a first width, the first fraction and the first width ensuring that the surface of the wafer can attract enough water to wet sufficiently allowing removal of residual particles therefrom. (See Fig. 4E, col. 1-10).

Thus, Lee is shown to teach all the features of the claim with the exception of disclosing the semiconductor region (402') is formed over a substrate.

However, Lyons teaches that the dielectric isolation can be formed in a semiconductor substrate or in an epitaxial layer formed over a semiconductor substrate. (See col. 3, ll. 25-45).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the semiconductor region (402') of Lee over a semiconductor substrate as taught by Lyons because the impurity concentration of the semiconductor regions (device layer) can easily be controlled and crystalline perfection can be achieved. This matter is well known in the art.

Product by process limitation:

The expressions "after chemical mechanical planarization" and "allowing removal of residual particles therefrom" are taken to be a product by process limitation and is given no patentable weight. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Note that, other means can be used to expose the surface of the semiconductor region and the dielectric, such as chemical etch.

Furthermore, since the device of Lee is formed having the dimensions as claimed, thus, it should function as claimed.

With respect to claim 30, insofar the device is concerned, Lee teaches a wafer having a surface substantially similar as claimed including:

means for attracting water (403) to the surface of the wafer (400); and

means for repelling water (402') from the surface of the wafer (400) comprising regions that have a combined surface area that is less than or equal to a first fraction of a surface area of the wafer, wherein each of the regions has a shortest surface dimension that is less than or equal to a first width, and the first fraction and the first width ensure that the surface of the wafer can attract enough water to wet sufficiently allowing removal of residual particles therefrom. (See Fig. 4E, col. 1-10).

With respect to: "wafer comprising regions above a substrate" and Product-by-process limitation, a similar reasoning as that of claim 1 is also applied here.

With respect to claim 44, insofar the device is concerned, Lee teaches a wafer having a surface substantially similar as claimed including:

a plurality of regions of hydrophobic material (402') and hydrophilic material (403) exposed at the surface of the wafer (400) *after chemical mechanical planarization*, wherein the

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regions of hydrophobic material (402') have a total surface area that is less than or equal to a first fraction of a surface area of the wafer (400) and each of the regions of hydrophobic material (402') have a shortest surface dimension that is less than or equal to a first width, and the first fraction and the first width ensure that the surface of the wafer (400) can attract enough water to wet sufficiently allowing removal of residual particles therefrom. (See Fig. 4E, col. 1-10).

With respect to: "wherein the regions of hydrophobic material are deposited over a substrate", and Product-by-process limitation, a similar reasoning as that of claim 1 is also applied here.

With respect to claims 2, 3, 31, 32, 45 and 46, the first fraction of Lee appears to be about 50% or 60% since the semiconductor regions (402') and the dielectric regions (403) appear to be evenly spaced. (See Fig. 4A).

With respect to claims 4, 5, 33, 34, 47 and 48, Lee teaches the first width (W) is about 0.44 mm. (See col. 5, lines 43-47).

Thus, is shown to teach all the features of the claim with the exception of explicitly disclosing the first width of 2.5 mm or 500 μ m.

Note that the specification contains no disclosure of either the *critical nature of the claimed dimension of any unexpected results arising therefrom*. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the

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Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the first width (W) of Lee larger than 0.44 mm so that more devices can be formed on the semiconductor region.

With respect to claims 6, 35 and 49, the semiconductor regions or the means for repelling water or the hydrophobic material (402') of Lee comprises silicon.

With respect to claims 7, 36 and 50, the dielectric region or the means for attracting water or the hydrophilic material (403) of Lee comprises silicon dioxide.

With respect to claims 8, 39 and 51, the regions of dielectric or the means for attracting water or the hydrophilic material (403) and semiconductor or the means for repelling water or the hydrophobic material (402') of Lee alternate along the surface of the wafer (400).

With respect to claims 9 and 37, the regions of dielectric or the means for attracting water (403) of Lee are elongated strips.

With respect to claims 10 and 40, the regions of semiconductor or the means for repelling water (402') of Lee are elongated strips.

With respect to claims 11, 38 and 53, the regions of dielectric or the means for attracting water or the hydrophilic material (403) of Lee are rectangular.

With respect to claims 12, 41 and 54, the regions of semiconductor or the means for repelling water or the hydrophobic material (402') of Lee are rectangular.

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With respect to claims 14 and 56, the region of semiconductor or the hydrophobic material (402') of Lee are interspersed within a sea of dielectric.

With respect to claim 43, the means for attracting (403) of Lee comprises dielectric, the means for repelling (402') water comprises semiconductor regions, and the semiconductor regions (402') are interspersed within a sea of dielectric.

With respect to claim 52, the regions of hydrophobic material (402') and hydrophilic material (403) of Lee are elongated strips.

3. Claims 13, 42 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee '696 as applied to claims 1, 30 and 44 above, and further in view of Inoue (U.S. Patent No. 4,656,054) of record.

Lee teaches semiconductor regions (402') of wafer (400) having various shapes.

Thus, Lee is shown to teach all the features of the claim with the exception of semiconductor regions having a shape of hexagon.

However, Inoue teaches semiconductor regions can be formed in to various shapes using a mask having a particular shapes such as hexagon. (See Fig. 8).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the semiconductor region of Lee having hexagonal shapes as taught by Inoue because more semiconductor regions having hexagonal shape can be made in a given area (Fig. 8) than the other shapes. (See Figs. 5 and 6).

Response to Arguments

4. Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

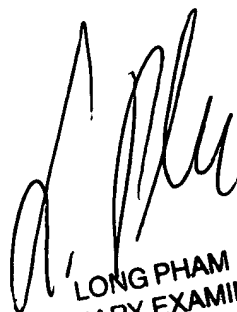
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
April 28, 2003



LONG PHAM
PRIMARY EXAMINER